Kenwood

PD8-20/20D
PD8-30/30D
PD18-20/20D
PD18-30/30D
PD35-20/20D

REGULATED
DC POWER SUPPLY

INSTRUCTION MANUAL

CONTENTS

*This manual covers the ten models; PD8-20, PD8-20D, PD8-30, PD8-30D, PD18-20, PD18-20D, PD18-30, PD18-30D, PD35-20 and PD35-20D. Please read the descriptions applicable to your model.

GENERAL

The PD series are compact DC power supplies regulated by phase control. They have sufficient reliability and accurate electrical characteristics and are suitable for research, experiments, aging of many hours, and for control, etc. They are provided also with means of protection and remote control. They are designed totally for the ease of use.

FEATURES

* The size is compact owing to the built-in phase-controlled preregulator.
* Characteristics of voltage regulation and against noises including ripples are very good.
* Both voltage and current vary little with temperature.
* The output voltage may be changeable in small steps with a potentiometer turnable as many as ten positions.
* The V/I CHECK switch provided permits to check the preset values of voltage and current even during operation.
* The OUTPUT switch turns on and off the output.
* Protection is complete from overvoltage, overcurrent, and excessive temperature rise. The OVP CHECK funciton provided permits to preset the overvoltage protection level and check the preset level during operation.
* Master/slave control is possible by series and parallel connections.
* The output voltage and current may be remote-controlled using an external resistance or external signals.
* Rapid transient characteristics are good.

SPECIFICATIONS

Model PD		8-20/20D	8-30/30D	18-20/20D	18-30/30D	35-20/20D
Output						
Output voltage 10-positions		0 to 8 V	0 to 8 V	0 to 18 V	0 to 18 V	0 to 36 V
Resolution (theoretical)		1.4 mV	1.4 mV	3.1 mV	3.1 mV	6.2 mV
Output current 1-position		0 to 20 A	0 to 30 A	0 to 20 A	0 to 30 A	0 to 20 A
Resolution (theoretical)		30 mA	45 mA	30 mA	45 mA	30 mA
Voltage regulation (CV)						
With input changes of ±10%	Note 1)	0.005% +1 mV				
With load changes of 0 to 100%	Note 1)	0.005% +1 mV	0.005% +2 mV			
Ripples/noises (10 Hz to 1 MHz) rms	Note 2)	0.5 mV rms				
Transient response, (standard value)		100 μsec, typical				
Temperature characteristic, (standard value)		100ppm/°C, typical				
Remote control resistance/voltage		approx. 0 to 10 kΩ/0 to 10 V				
Current regulation (CC)						
With input changes of ±10%		2 mA	3 mA	5 mA	5 mA	5 mA
With load changes of 0 to 100%		5 mA	5 mA	5 mA	5 mA	5 mA
Ripples/noises (10 Hz to 1 MHz) rms	Note 2)	5 mArms	10 mArms	10 mArms	10 mArms	10 mArms
Remote control resistance/voltage		approx. 0 to 10 kΩ/0 to 10 V				
Protection						
Operation		Turns off power switch				
Temperature detection		100°C				
Overvoltage protection level (standard value)		15 to 110% of rated output voltage				

Model PD		8-20/20D	8-30/30D	18-20/20D	18-30/30D	35-20/20D
Meter and indications						
Voltmeter (class 2.5) F.S		8 V	8 V	18 V	18 V	36 V
Ammeter (class 2.5) F.S		20 A	30 A	20 A	30 A	20 A
D type	Voltage at digital display (Auto range)	3-1/2 digits 19.99 V, 199.9 V (FS) two ranges ±(0.1% rdg+1 digit) 23°C±5°C; Less than 80% RH				
D type	Current at digital display (Fix. range)	3 digits 99.9 A (FS), ±(0.5% rdg+1 digit) 23°C±5°C, Less than 80% RH				
Indication of constant voltage operation		CV green LED lights				
Indication of constant current operation		CC red LED lights				
Indication of output		OUTPUT red LED lights when turned on				
Function						
Output switch		Turns on and off output (preset voltage indicated with meter during off time)				
Voltage/current check switch		Preset voltage and current indicated with meters during on time				
Overvoltage protection (OVP) preset		Indicates the over voltage protection level on the voltmeter during on time				
Remote sensing		Via the rear panel senser terminal				
Series control		Master/slave control (series control is not possible with 10 V maximum output models.)				
Parallel control		Master/slave control				
Operating conditions						
Temperature		0°C to 40°C				
Humidity		Less than 80%				
Cooling		Fan				
Output polarity		Positive or negative side grounded				
Withstand voltage to ground		±250VDC				
Insulation resistance						
Chassis-input line		30 MΩ or more at 500 VDC				
Chassis-output line		20 MΩ or more at 500 VDC				

Model PD		8-20/20D	8-30/30D	18-20/20D	18-30/30D	35-20/20D
Power supply						
Input voltage		AC 100 V/120 V/200 V/220 V ±10%, 216 V — 250 V, 1 ϕ selectable internally				
Power consumption (at AC 100 V)		Approx. 420 W	Approx. 590 W	Approx. 620 W	Approx. 930 W	Approx. 1 kW
		Approx. 670 VA	Approx. 960 VA	Approx. 1 kVA	Approx. 1.4 kVA	Approx. 1.5 kVA
Dimensions and weight						
Enclosure dimensions	(W)	208	208	208	208	208
	(H)	147	147	147	147	147
	(D)	348	457	420	457	420
Maximum dimensions	(W)	208	208	208	208	208
	(H)	168	168	168	168	168
	(D) (including power input connector)	411	520 (523)	483 (486)	520 (523)	483 (486)
Weight		Approx. 15 kg	Approx. 20 kg	Approx. 19 kg	Approx. 24 kg	Approx. 23 kg
Accessories						
Instruction manual		1	1	1	1	1
Input power cord	100 V, 120 V area	2 or 3-core AC cable (2 m)	2 or 3-core AC cable (2.5 m)	2 or 3-core AC cable (2.5 m)		
	200 V,220 V, 240 V area	3-core AC cable (2 m)			3-core AC cable (2.5 m)	
Connector retainer	100 V, 120 V area	NONE	1	1	1	1
	200 V, 220 V, 240 V area	NONE	NONE	NONE	1	1
Fuse	100 V, 120 V area	10 A×2	15 A×2	15 A×2	20 A×2	20 A×2
	200 V, 220 V, 240 V area	4 A×2	6 A×2	8 A×2	10 A×2	10 A×2

Notes: 1. Measured via the sensing terminal.
2. Measured with plus or minus grounded.

■ Circuit and ratings are subject to change without notice due to developments in technology.

PRECAUTION FOR USE

1) CHECKING INPUT VOLTAGE

1) Keep the permitted range of input voltage. Single phase, 100/120/200/220/240 V AC, ±10%, 50/60 Hz
2) The adapted input voltage is indicated at the AC input terminal on the rear panel.
3) When converted the line voltage, refer to the section of MAINTENANCE.

2) POWER CORD CONNECTION

Some models have a connector retainer on the AC cord connector to hold the cord from slipping off.
For safe operation, be sure the retainer is locked.

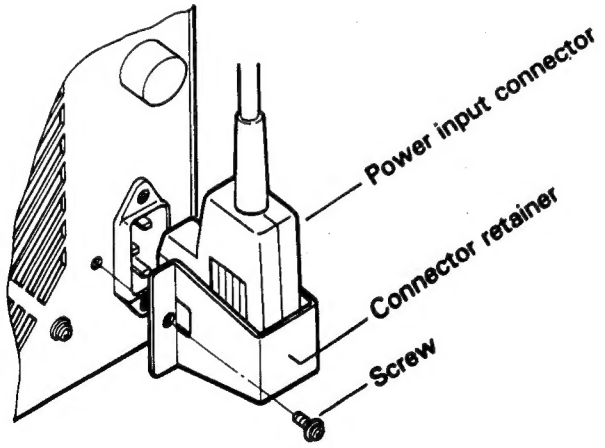


Fig. 1

3) OUTPUT CONNECTION

1) Make sure that the rear-panel output terminals and control terminals are connected with jumpers as shown Fig. 2.

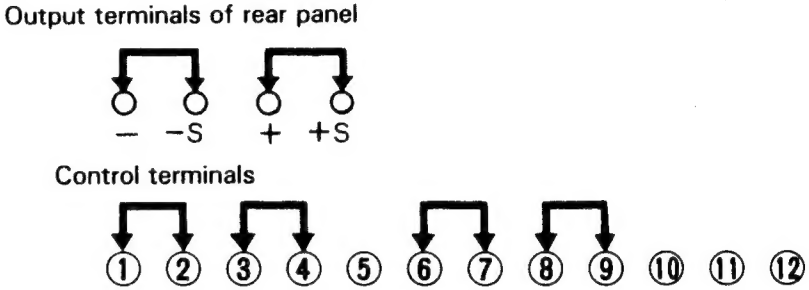


Fig. 2

2) The output lines are floating. Connect either of the front-panel output terminals to GND normally with short bar.

4) ENVIRONMENTAL CONDITIONS

1) Keep the operating temperature range of 0° to 40°C. If the ambient temperature rises excessively, the device's protection system works and cuts off power.
2) Keep clear the ventilation openings (at sides and bottom) and the passage of fan air. Install any other devices more than 30 cm apart from those openings.
3) Avoid to install the power supply in a dusty place and where there are much corrosive gases.
4) Avoid to install sensitive instruments on and beside the power supply.

CONTROLS AND INDICATORS

<FRONT PANEL>

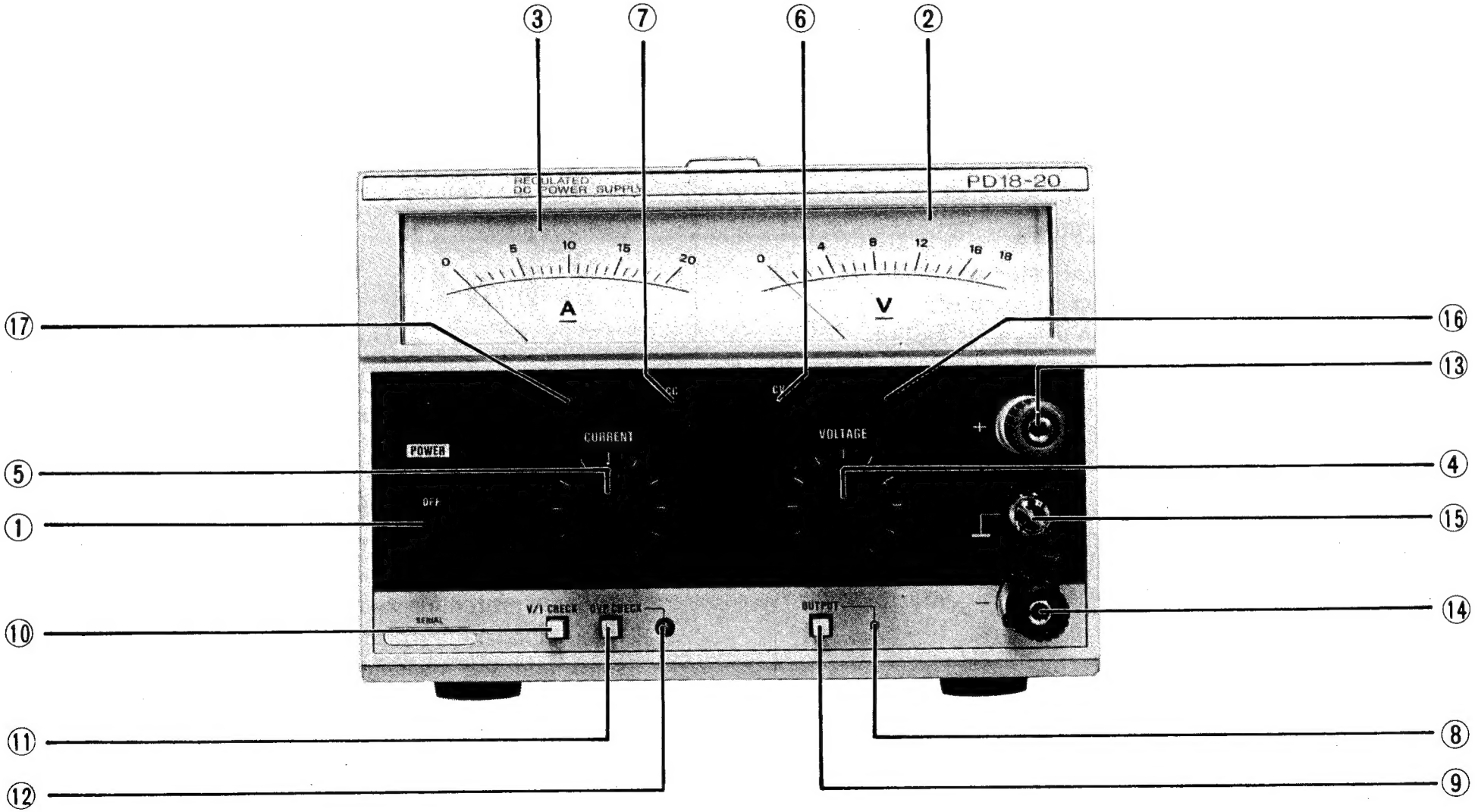


Fig. 3

① **POWER switch**
When turned on, the indicators POWER and either of CC and CV light. The power switch is automatically cut off when protection (overvoltage/overcurrnt/temperature) has operated.

② **Voltmeter**
Indicates the output voltage or the preset voltage.

③ **Ammeter**
Indicates the output current or the preset current.

④ **VOLTAGE**
Control that presets voltage for constant-voltage operation. Turn it clockwise to raise the output voltage.

⑤ **CURRENT**
Control that presets current for constant-current operation. Turn it clockwise to increases the output current.

⑥ **CV indicator**
Indicates during constant-voltage operation.

⑦ **CC indicator**
Indicates during constant-current operation.

⑧ **OUTPUT indicator**
Red LED indicates when the output is on. The preset voltage is available at the output terminals when this indicator is on.

⑨ **OUTPUT swtich**
Output switch (contactless) that turns on and off the output electrically. When the output is on (⎓), the OUTPUT indicator ⑧ lights and the voltage the voltmeter is reading is output at the output terminals and the ammeter reads the current.

⑩ **V/I CHECK**
Voltage/current check switch. As long as this switch is depressed, the voltmeter reads the preset voltage and the ammeter the preset current so that you may preset voltage and current. To check the preset voltage and current, depress this switch when the OUTPUT switch is on.

⑪ **OVP CHECK**
Overvoltage protection level check switch. Depress this switch and the voltmeter reads the preset overvoltage proteciton level so that you may preset the level with the OVP adjuster 12 .

⑫ **OVP adj. control**
Semi-fixed adjustment control permitting to preset the overvoltage protection level.

⑬ **Output terminal (+)**
Positive output terminal (red).

⑭ **Output terminal (−)**
Negative output terminal (white).

⑮ **GND**
Ground terminal connected to the frame. This is connected also to the output terminal (−) normally.

⑯ **Voltmeter zero adjuster**
Adjuster of the voltmeter zero point. (Not for D type)

⑰ **Ammeter zero adjsuter**
Adjuster of the ammeter zero point. (Not for D type)

<REAR PANEL>

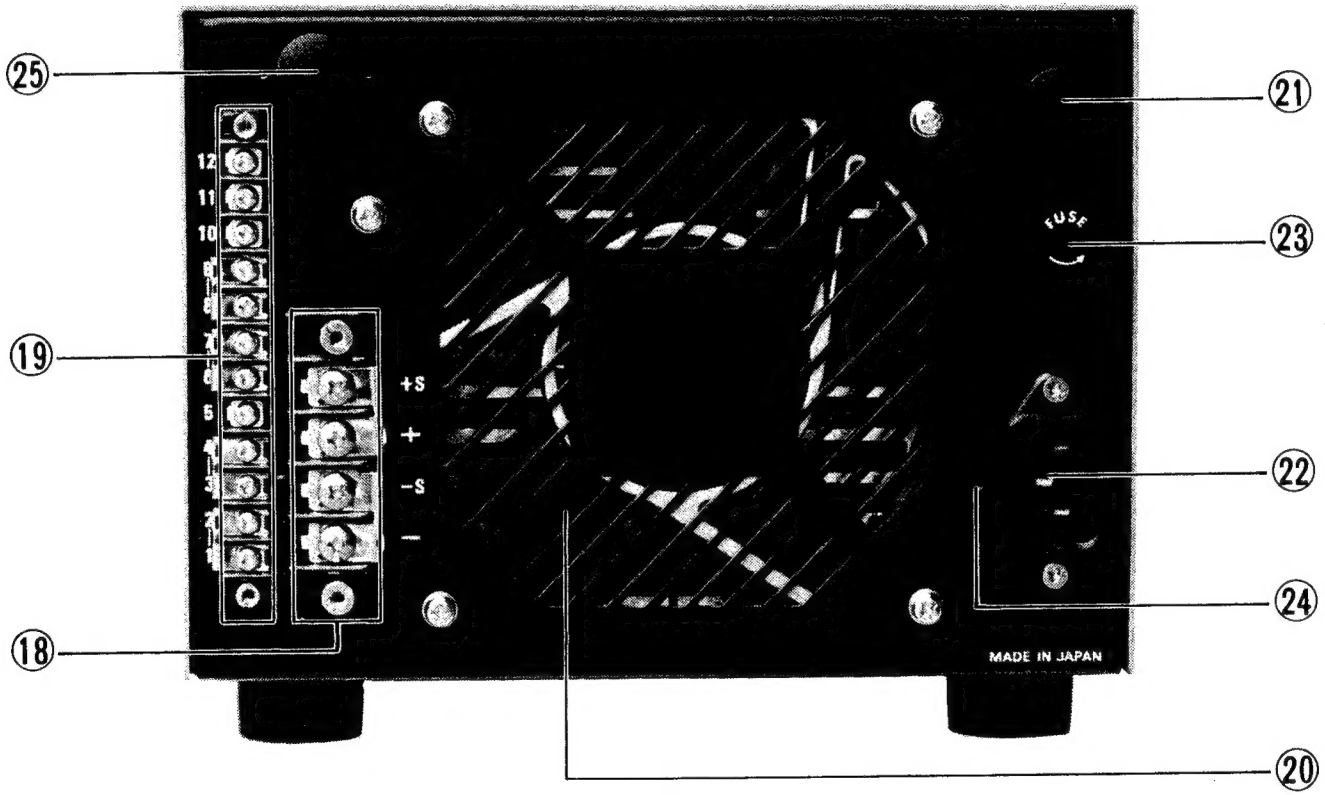


Fig. 4

⑱ **Output terminal**
± output terminals and ± sensor termianls.

⑲ **Control terminals**
Terminals for remote control and series/parallel operation.

⑳ **Fan**
Forced air cooled fan. Keep it apart from walls more than 30 cm.

㉑ **Cap**
Cap of the fuse holder.

㉒ **AC input terminals**
Input terminals of power supply. Connect the AC cord provided.

㉓ **Fuse holder**
Input fuse holder of power supply.

㉔ Hole for mounting the retainer of power input connector.

㉕ Cap for concealing optional-connector mounting hole.

OPERATION

AS A CONSTANT-VOLTAGE POWER SUPPLY

1) Check the rated input voltage, then connect the power cord.
2) Turn the voltage adjuster knob (VOLTAGE) fully counter-clockwise.
3) Turn on the power switch. The POWER (red) indicator light and the device is operated. Make sure that the OUTPUT switch is off (the indicator is out).
4) Set a desired voltage with the voltage adjuster knob (VOLTAGE). No voltage develops at the output terminals still.
5) Set a current limit.
   Keeping the V/I CHECK switch depressed, set a desired limit of output current with the current adjuster knob (CURRENT).
6) Turn on output.
   Turn on the OUTPUT switch, and the preset voltage is output at the output terminals with the output indicator lit.
   Notes:
   (1) If excessive current flows as when the load is shorted, the device performs constant-current operation at the preset limit of output current and the output voltage falls.
   (2) If the overvoltage protection level is set lower than the preset level of output voltage, the power switch will be turned off by overvoltage protection.
   See how to set overvoltage proteciton.

AS A CONSTANT-CURRENT POWER SUPPLY

1) Check the rated input voltage, then connect the power cord.
2) Turn the current adjuster knob (CURRENT) fully counter-clockwise.
3) Turn on the power switch. The POWER (red) indicator lights and the device is in constant-current mode. Make sure that the OUTPUT switch is off (the indicator is out).
4) Set a desired current.
   Keeping the V/I CHECK switch depressed, set a desired constant current with the current adjuster knob (CURRENT).
5) Set a voltage limit.
   Set a desired voltage limit with the voltage adjuster knob (VOLTAGE). It is the overvoltage protection level.
6) Turn on output.
   Turn on the OUTPUT switch, and the output indicator lights and the power is output through the output terminals.
   Note:
   If it is not preferable to apply current suddenly like to a large inductance load, turn the current adjuster knob (CURRENT) fully counterclockwise and increase current gradually after turning on the output.

APPLICATION

HOW TO CHECK VOLTAGE AND CURRENT

1) Voltage/Current presetting

When the V/I CHECK switch is depressed, the constant-voltage is indicated on the voltmeter and constant current is indicated on the current meter. Hereupon, it is possible to set a desired voltage or current with the voltage adjuster knob (VOLTAGE) or current adjuster knob (CURRENT).

2) Voltage/Current check

When the V/I CHECK switch is depressed at constant-current operation, the preset current and the preset voltage can be checked.

HOW TO SET OVERVOLTAGE PROTECTION (OVP) LEVEL

Keeping the OVP CHECK switch depressed, the overvoltage protection level indicated on the voltmeter.

(1) Turn off the OUTPUT switch.

(2) Keeping the OVP CHECK switch depressed, screw the OVP adjuster with a screwdriver and set an overvoltage protection level.

(3) Turn on the OUTPUT switch with no load connected (the indicator lights). Raising the output voltage gradually, check if the power switch turns off at the preset over-voltage protection level.

(4) Set the overvoltage protection level at the maximum reading of the output voltmeter if overvoltage protection is not necessary.

USE OF REAR-PANEL TERMINALS

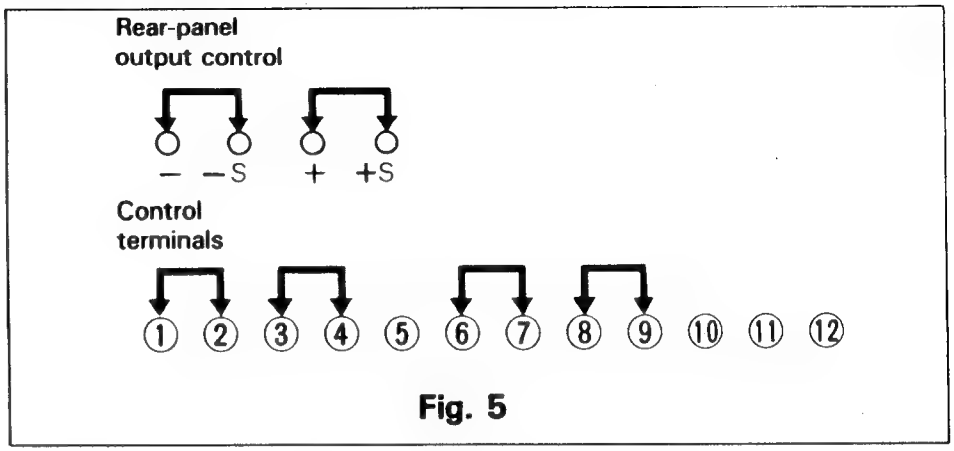


Fig. 5

The output and control terminals shown above are equipped on the rear panel. These terminals may be used to perform remote sensing, remote control of output voltage and output current, master/slave control operation with power supply connected in series or parallel.

REMOTE SENSING

When the device is connected to a load, voltage drops due to contact resistance at the output terminals and resistance of conductors. Remote sensing is performed to compensate for the voltage drop.

1) Turn off power.
2) Remove the short bars ⊕ – (+S) and ⊖ – (–S).
3) Connect (+S) and (–S) to the load. Use a two-core shield cable for these sensing lines and connect the shield line to ⊕ output.

4) ⊕ and ⊖ may be taken out from the output terminals on the panel or directly connected to the load from the ⊕ and ⊖ terminals of the rear panel. Voltage drop of up to 1.2 V per way of the output line may be compensated for. If the voltage drop is larger than 0.5 V, the maximum rated voltage drops accordingly.

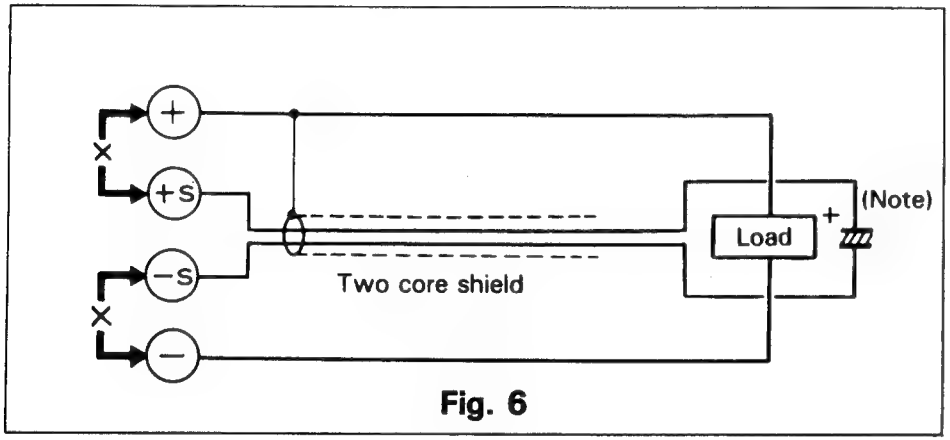


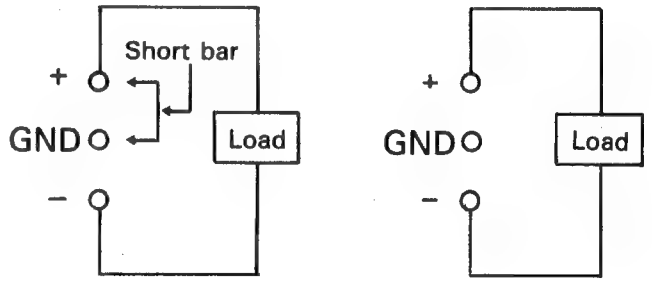
Fig. 6

Note:
If the load is remote, oscillation might happen due to inductance and capacitance of the output line. In such a case, connect an electrolytic capacitor of some 100 μF in parallel with the load as shown above.

REMOTE CONTROL OF CONSTANT-VOLTAGE (Resistance, voltage)

PRECAUTIONS WHEN USING REMOTE CONTROL

This unit adopts the floating circuit system. It has terminals isolated from the frame and controls output power on the basis of the positive (+) output terminal.
To control the constant voltage and constant current settings using external voltage, connect the positive (+) output terminal and GND terminal on the front panel as follows:
The GND and positive (+) terminals should be connected with the short bar (as shown above) or open (as shown below):



Note:
When the constant voltage and current are to be controlled using external voltage, the short bar or any load should not be connected between the negative (−) and GND terminals.

Control by resistance (I)

It is possible to output voltage which is proportional to resistance.

1) Turn off power.
2) Remove the short bar ① - ② .
3) Connect variable resistor R_1 (10 k ohms) across ① and ③ as shown Fig. 7.

Note:

R_1 must be 10 k ohms. Use a two-core shield cable and connect the shield line to ⑤ . For R_1 select one which will be affected little by temperature changes, aging effects, and noises.

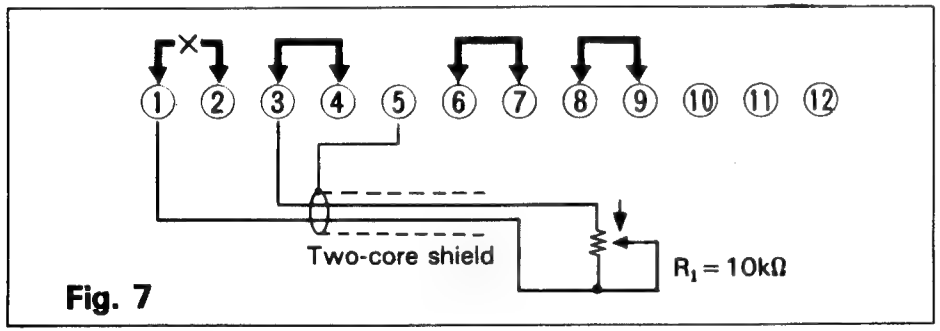


Fig. 7

$$\text{Ouput voltage } V_0 \fallingdotseq \frac{V_{max}}{10} \times R_1$$

V_0 [V]: Output voltage
V_{max} [V]: Maximum rated output voltage
R_1 [kΩ]: External resistance

Control by resistance (II)

It is possible to output voltage which is inversely proportional to resistance. Overshoot does not occur when switching resistance.

1) Turn off power.
2) Remove the short bar ③ - ④ and connect variable resistor R_2 across ③ and ④ as shown Fig. 8. Use a two-core shield cable and connect the shield line to ⑤ .

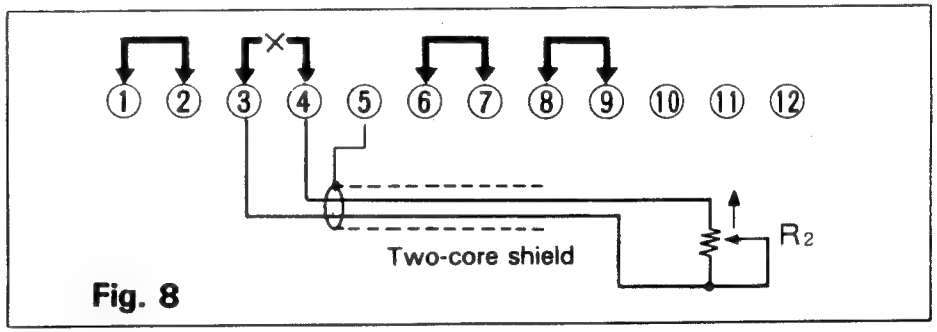


Fig. 8

$$\text{Output voltage } V_0 \fallingdotseq \frac{R_f}{R_s + R_2} \times V_{ref} \text{ [V]}$$

V_{ref}: Reference voltage (approx. 0 ~ 10 V). Set with the voltage control of the panel.
R_2: $0 \leqq R_2 \leqq \infty$
R_s, R_f: Constants depending on model.

PD-	8-20/20D	8-30/30D	18-20/20D	18-30/30D	35-20/20D
Rs (kΩ)	10 kΩ	10 kΩ	10 kΩ	10 kΩ	10 kΩ
Rf (kΩ)	8 kΩ	8 kΩ	18 kΩ	18 kΩ	36 kΩ

Note:
The output voltage is determined with R_2 and V_{ref} as given above. The output voltage is 0 V if R_2 is infinite (open). Set V_{ref} with the voltage control provided on the panel. To fix it or set it externally, connect a 10 k ohm resistor which has a good temperature characteristic across ① and ③ according to "Control by resistance (I)". The voltage control of the panel is now ineffective.

Note:
Be sure to adjust the output voltage at OUTPUT ON mode. In OUTPUT OFF or V/I CHECK mode, there is a slight error in meter reading.

Control by external voltage

It is possible to output voltage which is proportional to voltage.

1) Turn off power.
2) Remove the short bar ③-④ and connect external voltage V_1 across ④ and ⑤ as shown Fig. 9. Be very careful about the polarity.

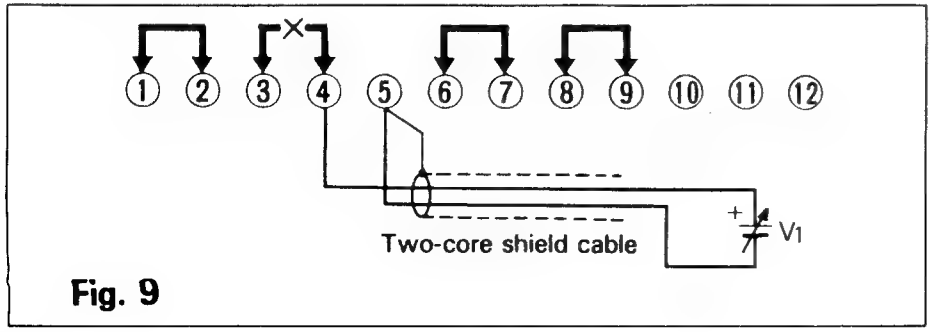


Fig. 9

Note:
The external signal voltage should be 0-10 V. The input impedance across ④ and ⑤ is approximately 10 k ohms. Use a two-core shield cable and connect the shield line to ⑤.

$$V_0 \fallingdotseq \frac{V_{max}}{10} \times V_1 \quad (0 \leq V_1 \leq 10\ V)$$

V_0 [V]: Output voltage
V_1 [V]: External signal voltage
V_{max} [V]: Maximum rated output voltage.

REMOTE CONTROL OF CONSTANT CURRENT (Resistance, voltage)

Refer to the "PRECAUTIONS WHEN USING REMOTE CONTROL" under "REMOTE CONTROL OF CONSTANT-VOLTAGE"

Control by resistance

Control of constant-current is possible in proportion with resistance.

1) Turn off power.
2) Remove the short bar ⑥-⑦.
3) Connect variable resistor R3 (10 k ohms) across ⑥ and ⑧ as shown Fig. 10.

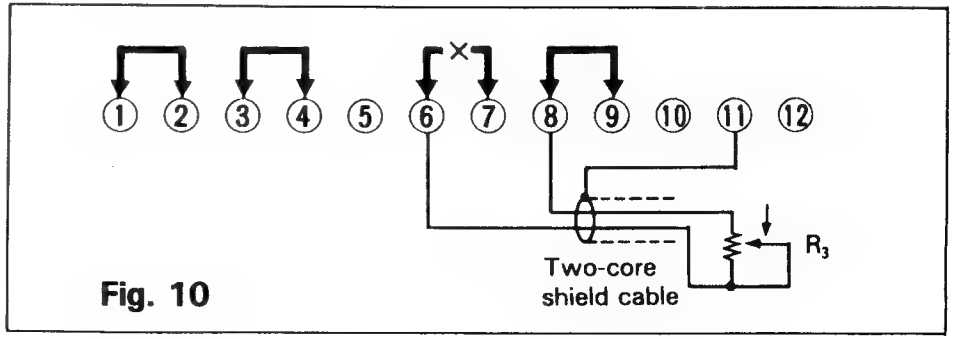


Fig. 10

Output current $I_0 \fallingdotseq \frac{I_{max}}{10} \times R_3$ [A]

I_0 [A]: Output current
I_{max} [A]: Maximum rated current
R_3 [kΩ]: External resistance

Note:
RV_3 must be 10 k ohms or less ($R_3 \leqq 10$ kΩ). Use a two-core shield cable and connect the shield line to ⑪ .

Control by external voltage

It is possible to control constant current in proportion to voltage.

1) Turn off power.
2) Remove the short bar ⑧-⑨ and connect external voltage V_2 across ⑨ and ⑪ as shown Fig. 11. Be very careful about the polarity.

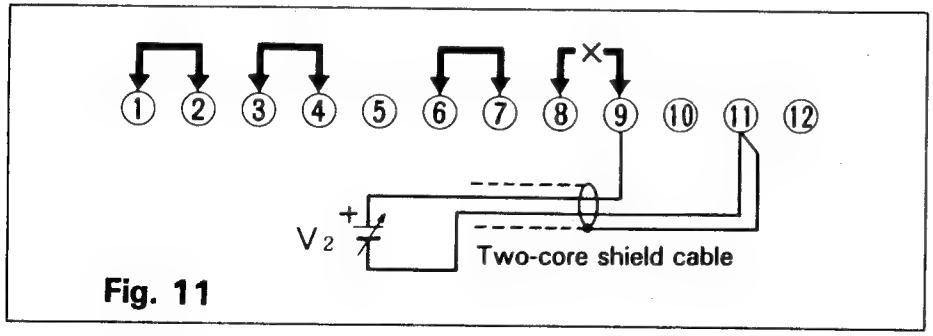


Fig. 11

$I_0 \fallingdotseq \frac{I_{max}}{10} \times V_2$ [A]

I_0 [A]: Output current
I_{max} [A]: Maximum rated current
V_2 [V]: External signal voltage

$(0 \leqq V_2 \leqq 10$ V)

Note:
The external signal voltage should be 0-10 V. The input impedance across ⑨ and ⑪ is approximately 10 k ohms. Use a two-core shield cable and connect the shield line to ⑪ .

SERIES/PARALLEL CONNECTED OPERATION

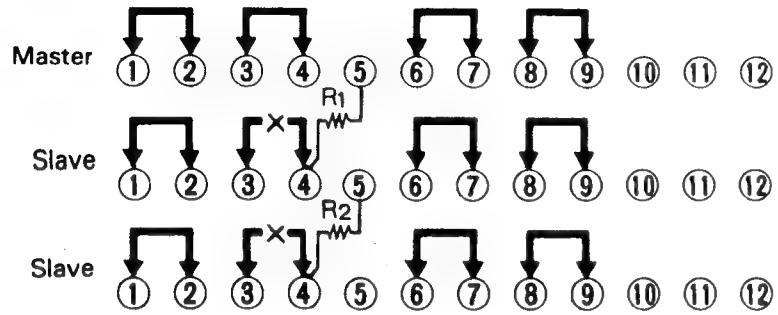
With some units connected in series or in parallel, it is possible to control all units with one unit taken as the master and the other as slaves.

Series connection

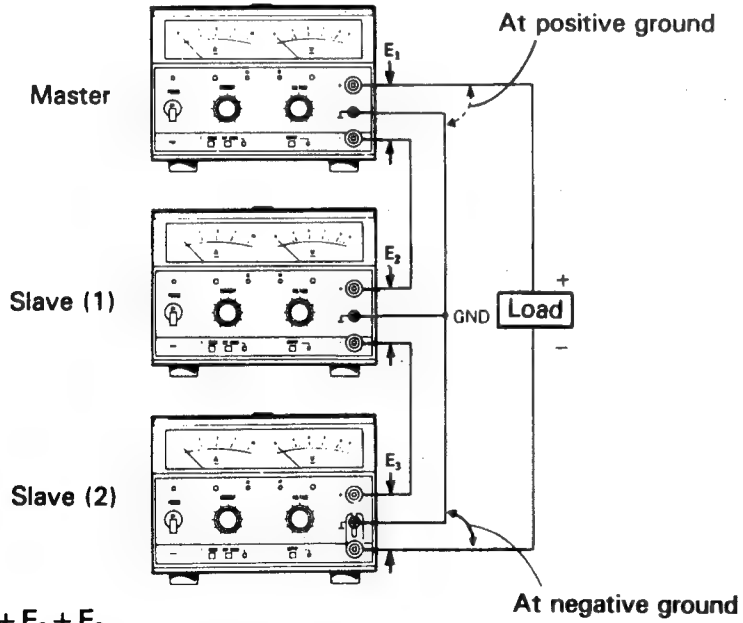
The output voltage is the sum of the output voltages of the units. The output voltage and current of each slave unit are controllable with the constant-voltage and constant-current controls of the master unit.

1) Turn off power.
2) Remove the short bar ③-④ of each slave unit.
3) Connect external resistor R as shown Fig. 12.
4) Ground the GND terminal either of the master unit if the positive line is grounded or of the last slave unit if the negative line is grounded. (The output conneciton diagram shows the negative line grounded.)

Connect of control terminals



Output connection



$E_0 = E_1 + E_2 + E_3$

* Set the current controls of all slave units at maximum position.

Fig. 12

How to determine external resistance R_1 and R_2

$$R_1 \fallingdotseq \left(\frac{E_1}{E_2} \times R_f \right) - R_s \, [k\Omega] \quad (R_1 \geqq 0 \, (k\Omega),\ E_2 \leqq \frac{R_f}{R_s})$$

E_1 [V]: Output voltage of master

E_2 [V]: Output voltage of slave ① when master's output voltage is E_1

R_s, R_f: Slave ①'s constants depending on model.

PD-	8-20/20D	8-30/30D	18-20/20D	18-30/30D	35-20/20D
Rs (kΩ)	10 kΩ	10 kΩ	10 kΩ	10 kΩ	10 kΩ
Rf (kΩ)	8 kΩ	8 kΩ	18 kΩ	18 kΩ	36 kΩ

To obtain R_2, replace E_1 and E_2 with E_3 in the above equation. Now, master unit controls slave unit ① and slave unit ① controls slave unit ②.

Notes:

(1) These connection conditions are not satisfied on the models below 10 V in rated output. For details, contact the nearest agent or our distributor.

(2) Maximum voltage during series operation does not exceed rating of the withstand voltage to ground. Be careful about the power ratings of R_1 and R_2 and use ones having a good temperature characteristic.

$$\text{Power rating [W]} = \left(\frac{E_1}{R_1 + R_s} \right)^2 \times R_1$$

For remote sensing during series operation, use the (+S) terminal of the master with the ⊕ sensor or the (−S) terminal of the last slave with the ⊖ sensor (refer to the section of remote sensing).

Parallel connection

The output current is the sum of the output currents of the units. The output voltage and current of each slave unit are controllable with the constant-voltage and constant-curent controls of the master unit.

1) Turn off power.
2) Remove the short bar ⑧-⑨ of each slave unit.
3) Connect the master and slave units as shown Fig. 14.
4) Make connection between each unit and load with a cable of the same length.
5) Ground the GND terminal of the master unit's panel. (The output connection diagram shows the negative line grounded.)

The master unit performs constant-voltage operation (CV) and the slave units constant-current operation (CC).

For remote sensing during parallel operation, make connection from the (+S) and (−S) terminals of the master (refer to the section of remote sensing).

With the rated output voltage is less than 10 V, this connection is not possible.

Note:
For connection of the parallel operation with different models, consult agent and our distributor.

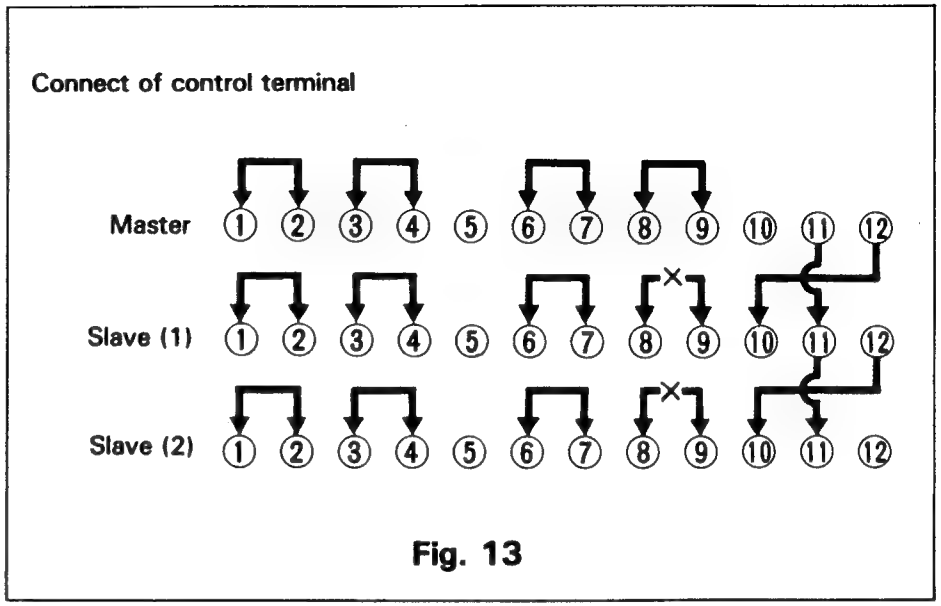


Fig. 13

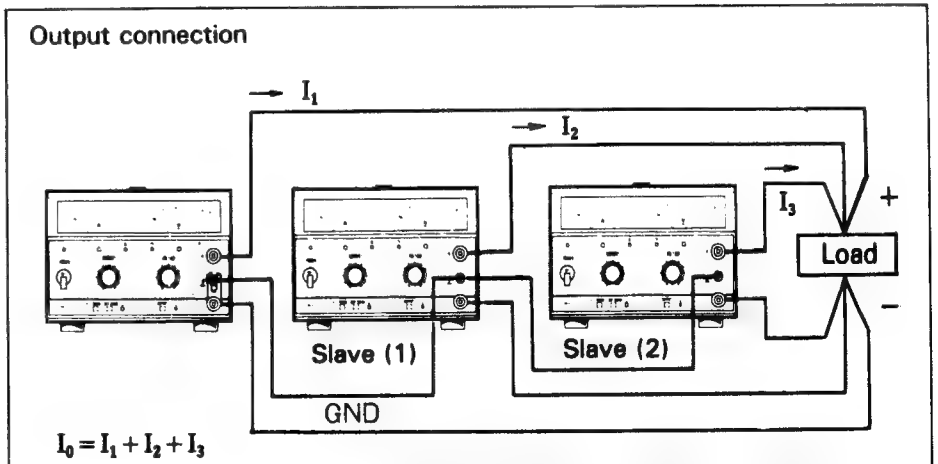


Fig. 14

CONSTANT-CURRENT CHARGING/ DISCHARGING OF BATTERY

Constant-current charging

It is possible to charge a battery or capacitor automatically with a charging current or a final voltage preset.

1) Keeping the V/I CHECK switch depressed, set the final charging voltage with the constant-voltage control and the charging current with the constant-current control.
2) Close switch S_1, and constant-current charging starts and continues until the final voltage is reached.

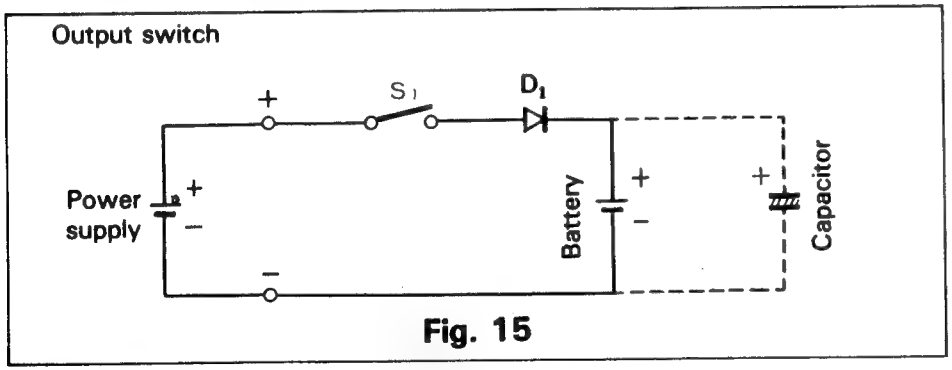


Fig. 15

Notes:

(1) Be sure to equalize the polarity of the supply power and battery.

(2) Current would flow back into the power source if the supply voltage is lower than the battery voltage, the OUTPUT switch is off, or power supply is turned off. In this case reconnect diode D_1 in the forward direction.

Constant-current discharging

Connect load resistor R as shown Fig. 16. We assume the battery terminal voltage as E and discharging current as I.

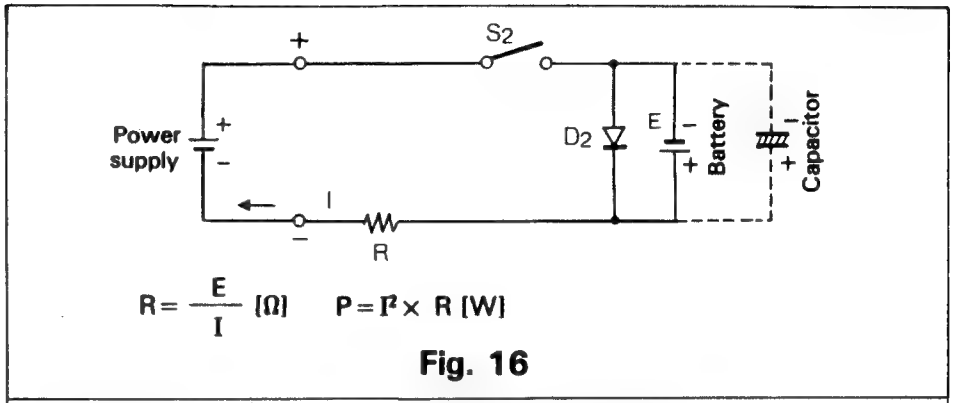


Fig. 16

1) Keeping the V/I CHECK switch depressed, set the output voltage at a few volts higher than the battery voltage with the constant-voltage control and the discharging current with the constant-current control.
2) Be sure to connect a load resistor of discharging. (Direct connection of battery or capacitor may cause damage to this unit)
3) Close switch S_2, and constant-current discharging starts and continues until the final voltage is reached.

Notes:

(1) Use switch S_2 to turn on and off discharging. (If the OUTPUT switch or power switch is off, current flows in this unit through the protecting diode connected in parallel with the output terminals.)

(2) Be careful about the power consumption of the load resistor of discharging.

(3) Connect the blocking diode to protect the battery.

MAINTENANCE AND ADJUSTMENT

MAINTENANCE

Removal of cases

To remove the case, slacken off the screws on the top and side cases of the unit, and pull it up.

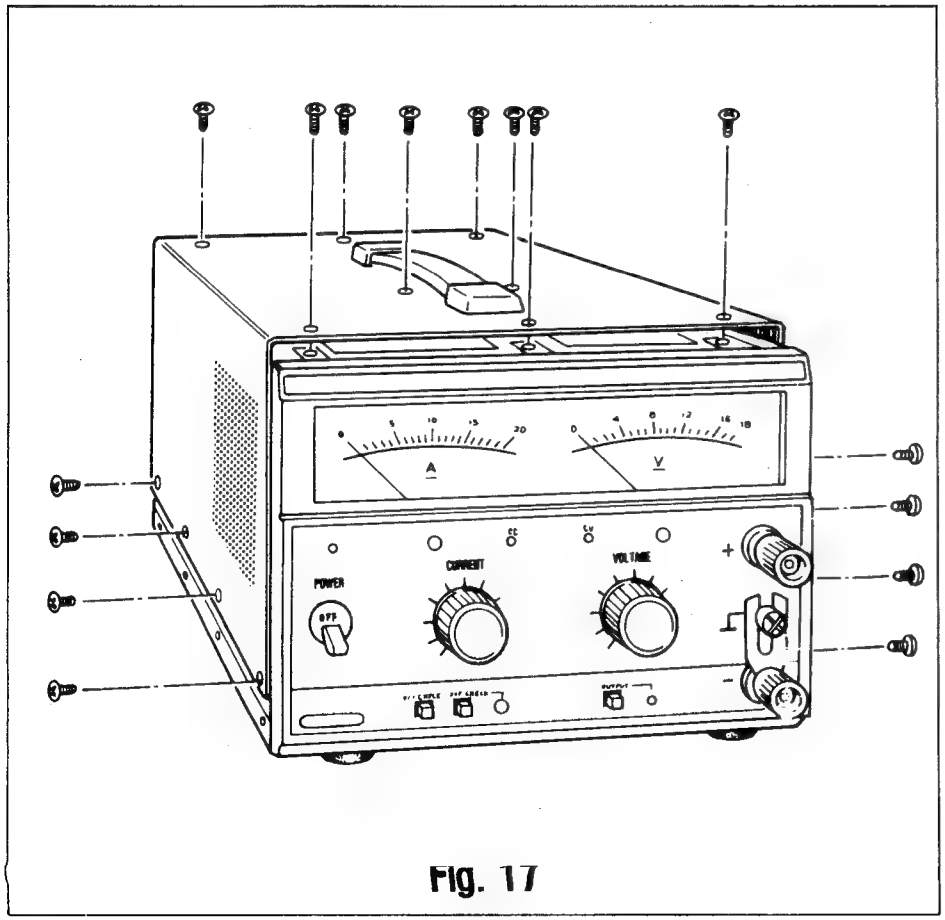


Fig. 17

Voltage conversion

To convert the device to the line voltage, change the power transformer and fuse as noted below. It is not necessary to change the fan.

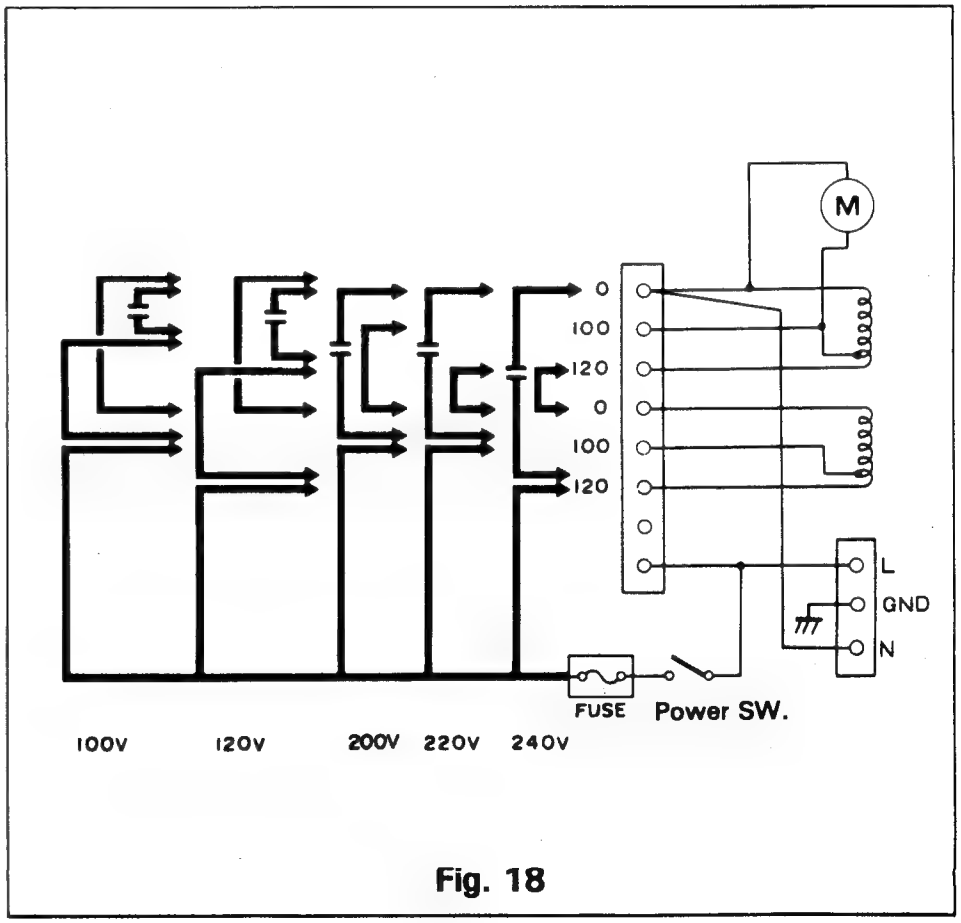
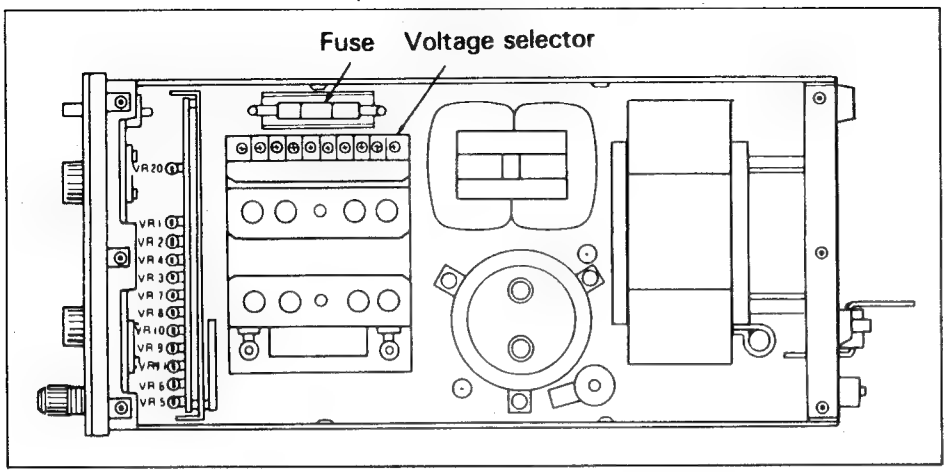


Fig. 18

PD18-20/20D, PD18-30/30D, PD35-20/20D



PD8-20/20D, PD8-30/30D

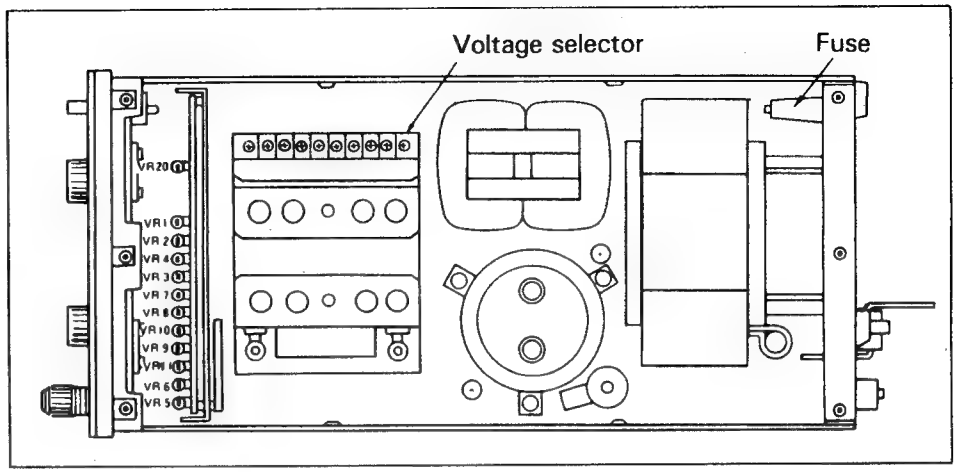


Fig. 19

Fuse replacement

Use the fuse whose rating is just as specified on the fuse holder according to the line voltage.

	100 V	120 V	200 V	220 V	240 V	
PD8-20/20D	10 A	10 A	4 A	4 A	4 A	Rear Panel
PD8-30/30D	15 A	15 A	6 A	6 A	6 A	Rear Panel
PD18-20/20D	15 A	15 A	8 A	8 A	8 A	
PD18-30/30D	20 A	20 A	10 A	10 A	10 A	
PD35-20/20D	20 A	20 A	10 A	10 A	10 A	

Caution

Before replacing the fuse, unplug the power cord from the AC outlet.

ADJUSTMENT

As initial adjustment is completed, take note of the following if readjustment is to be done.

- Use a well-insulated screwdriver to perform adjustment.
- Start to supply the device with power 30 minutes or more before starting adjustment.
- If some measuring instruments are needed, leave the adjustment to call the dealer.
- Adjust the zero of the voltmeter and the ammeter before starting adjustment.

VOLTAGE ADJUSTMENT

Adjustment of V REF OFFSET

With the CV control turned fully counterclockwise, adjust VR2 to read 0 V across ③ and (+S) of the rear panel.

Adjustment of V REF GAIN

With the CV control turned fully clockwise, adjust VR1 to read 10.25 V across ③ and (+S) of the rear panel.

Adjustment of V METER OFFSET

With the CV control turned fully counterclockwise and the OUTPUT switch turned off, adjust VR8 so that the V-meter read 0 V.

V OUT OFFSET

With the CV control turned fully counterclockwise and the CC control fully clockwise and the OUTPUT switch on, adjust VR11 so that the V-meter read 0 V.

Adjustment of V METER GAIN

At the rated output, adjust VR7 so that the V-meter deflect fully to the end of the scale.

Adjustment of V CHECK

With the V/I CHECK switch on, adjust VR5 so that the V-meter read the output voltage.

CURRENT ADJUSTMENTS

Adjustment of I REF OFFSET

With the CC control turned fully counterclockwise, adjust VR4 to read 0 V across ⑧ and ⑪ of the rear panel.

Adjustment of I REF GAIN

With the CC control turned fully clockwise and the OUTPUT switch on, adjust VR3 so that the current become the rated value plus 2.5%.

Adjustment of I METER OFFSET

With the CC control turned fully counterclockwise and the OUTPUT switch off, adjust VR10 so that the I-meter read 0 V.

Adjustment of I METER GAIN
At the rated output, adjust VR9 so that the I-meter deflect fully to the end of the scale.

Adjustment of I CHECK
With the V/I CHECK switch on, adjust VR6 so that the I-meter read the output current.

Adjustment of V CE
Adjust VR20 so that voltage become approximately 4.5 V DC at the back of the emitter resistor and the collector of the series control transistor.

OPTIONAL ACCESSORIES

Rack mount adapter **RK-601**

GP-IB adapter **GP-610**

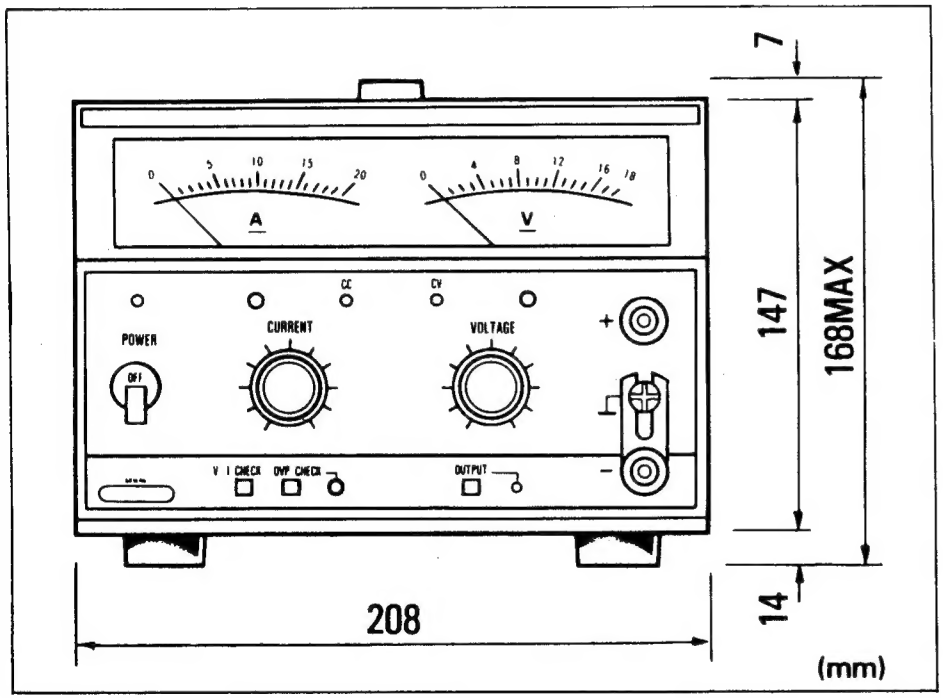
I/O adapter **DT-611**

TROUBLESHOOTING

Check as noted below if there is anything wrong.
If the trouble cannot be correct, call the dealer.

Symptom	Check	Cause
Power switch does not turn on.	1. Power lamp not lit.	Power cord disconnected or connected defectively. Input switch defective. Input fuse blown.
	2. Short bar coming off.	Rear-panel short bar disconnected or loose.
	3. Overvoltage protection worked.	Voltage set too low.
Output voltage is zero or low.	1. Short bar coming off	Short bar installed defectively.
	2. Constant-voltage/current lamps do not switch.	Circuit defective.
	3. Ammeter deflects with output off.	Output diode broken.
	4. Oscillating	Oscillation by remote sensing.
Output is excessive.	1. Short bar coming off.	Short bars ①-② and ⑥-⑦ come off.
	2. Output voltage/current do not fall.	Power transistor or control circuit defective.
Output is not steady.	1. Short bar coming off.	Short bar installed defectively.
	2. Input voltage wrong.	Out of the rated input voltage range.
	3. Oscillating	Oscillation by special load.
	4. Sensing termnal floating.	Proper connection of sensing terminal.
	5. Strong magnetic/electric fields near-by.	Keep away from oscillation sources.
	6. Other	

DIMENSIONS



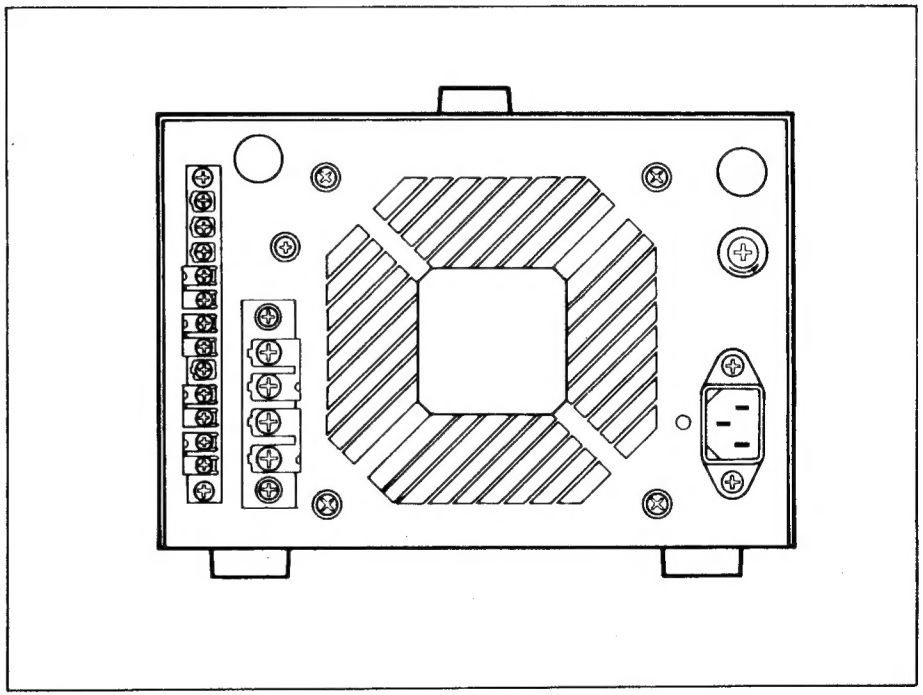


Fig. 20

(mm)

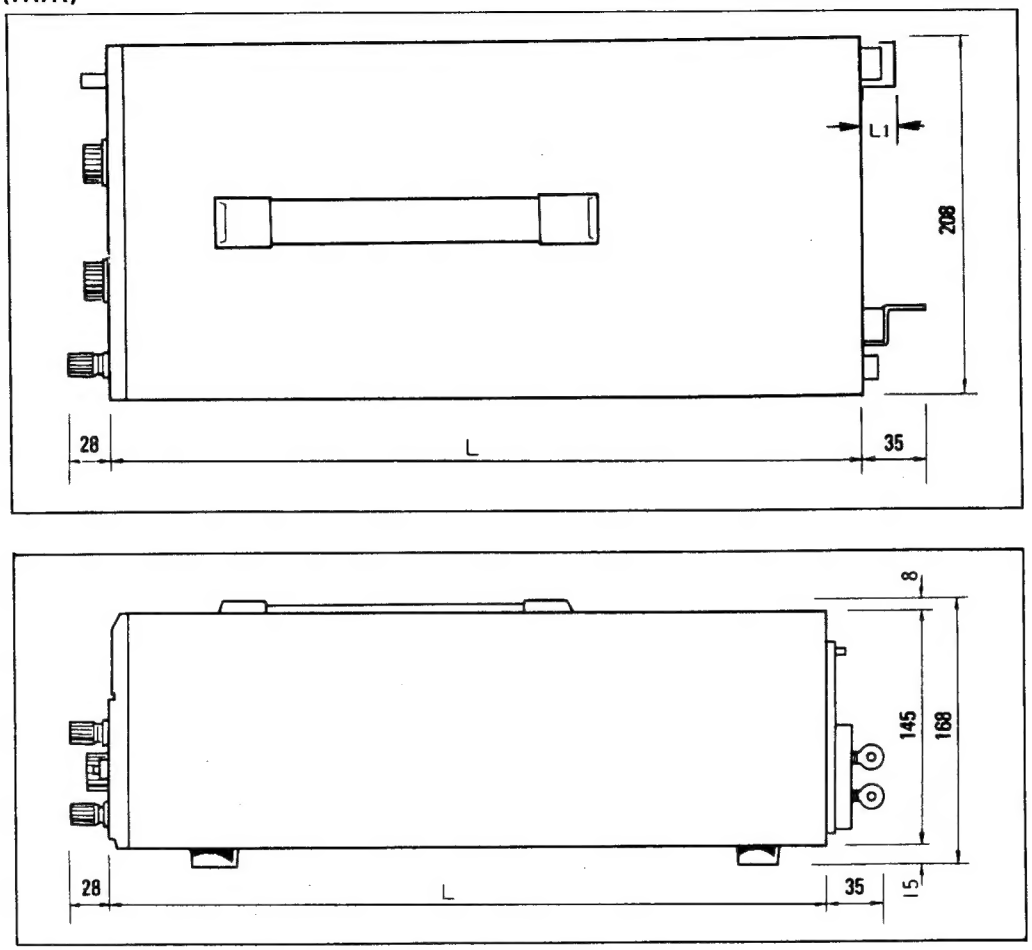


Fig. 21

PD-	8-20/20D	8-30/30D	18-20/20D	18-30/30D	35-20/20D
L (mm)	348	457	420	457	420
L_1 (mm) (including power input connecter)	32	38	38	38	38